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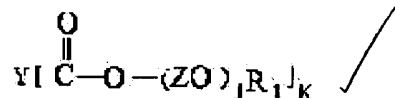
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(54) RUBBER COMPOSITION AND VULCANIZED RUBBER COMPOSITION

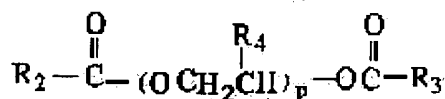
(57)Abstract:

PROBLEM TO BE SOLVED: To obtain the subject composition, having a low electrical resistance value, excellent in electroconductivity, capable of preventing bleeding, etc., from occurring and excellent in appearance by including an ethylene-olefin-based copolymer rubber and a surface treated filler therein.

SOLUTION: This rubber composition is obtained by including (A) 100 pts.wt. ethylene- α -olefin-based copolymer rubber and (B) 10-500 pts.wt. surface treated filler prepared by compounding a compound represented by formula I (Y is a substituted 2-22C aliphatic or aromatic carboxylic acid residue; R1 is H or a 1-15C alkyl; Z is a 2-4C alkylene) J is 1-30; K is 1-4) and/or a compound represented by formula II [R2 and R3 are



I



II

each a 1-15C alkyl or a 1-15C alkenyl; R4 is H or methyl; (p) is 2-20] with an alkali metallic salt-containing compound and/or an alkaline earth metallic salt-containing compound [e.g.

LiClO₄ or Ba(ClO₄)₂] and supporting the resultant composition on a filler (e.g. calcium carbonate or silica).

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to a rubber constituent and a vulcanized-rubber constituent. Furthermore, in detail, this invention is a rubber constituent which contains ethylene-alpha olefin system copolymer rubber in a rubber component, its electric resistance value is low and therefore it is excellent in conductivity, and prevents generating of bleeding etc., therefore is excellent in appearance, and relates to the rubber constituent and vulcanized-rubber constituent which can moreover be made white.

[0002]

[Description of the Prior Art] Since the ethylene-alpha olefin system copolymer rubber represented by ethylene-propylene rubber is excellent in weatherability, ozone-proof, thermal resistance, etc., it has the latus use on various kinds of office-supplies parts, electric product parts, etc.

[0003] It is required for the rubber goods used for the use of various kinds of office-supplies parts, electric product parts, etc. that an electric resistance value should be low, i.e., excel in conductivity. This is for preventing various kinds of obstacles by accumulation of static electricity. As a method of raising the conductivity of rubber goods, the method of blending carbon black so much is learned. However, the rubber goods obtained by this method became black inevitably, and were inadequate from an esthetic viewpoint, and it was difficult [it] to give sufficient conductivity, suppressing dirt, such as OA paper used for a business-machine machine. Moreover, the method using a specific plasticizer is indicated by JP,2-245038,A. However, in this method, it was inadequate [suppressing generating of bleeding etc.] to have obtained white rubber in the point of giving sufficient conductivity, although it was possible.

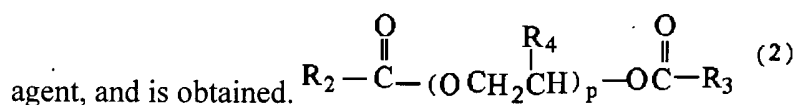
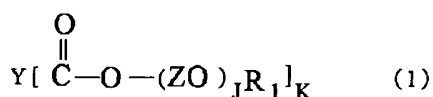
[0004]

[Problem(s) to be Solved by the Invention] In view of this present condition, the technical problem which this invention tends to solve is a rubber constituent which contains ethylene-alpha olefin system copolymer rubber in a rubber component, its electric resistance value is low, and, therefore, it excels in conductivity, and generating of bleeding etc. is prevented, and, therefore, it excels in appearance, and consists in the point of offering the rubber constituent and vulcanized-rubber constituent which can moreover be made white.

[0005]

[Means for Solving the Problem] That is, invention of one relates to the rubber constituent containing the following (A) component and the (B) component among this inventions.

(A): Ethylene-alpha olefin system copolymer rubber (B) : the surface treatment bulking agent which supports the compound which blends an alkali-metal salt content compound and/or an alkali-metal earth salt content compound, and is obtained to the compound expressed with the compound and/or the following general formula (2) which are expressed with the following general formula (1) to a bulking



(Y expresses the aliphatic series of the carbon numbers 2-22 which may have a substituent, an alicyclic or aromatic carboxylic-acid residue, or the carboxylic-acid residue of an epoxy cyclohexane ring among a formula (1), R1 expresses the straight chain of a hydrogen atom or carbon numbers 1-15, or the alkyl group of branching, Z expresses the alkylene machine of carbon numbers 2-4, J expresses the number of 1-30, and K expresses the integer of 1-4.) The inside of a formula (2), and R2 And R3 The alkyl group or alkenyl machine of carbon numbers 1-15 is expressed, and it is R4. Expressing a hydrogen atom or a methyl group, p expresses the integer of 2-20.

[0006] Moreover, other invention relates to the vulcanized-rubber constituent obtained by vulcanizing the above-mentioned rubber constituent among this inventions.

[0007]

[Embodiments of the Invention] The (A) component of this invention is ethylene-alpha olefin system copolymer rubber.

[0008] As an alpha olefin, a propylene, 1-butene, 1-pentene, 1-hexene, 4-methyl-1-pentene, 1-octene, 1-decene, etc. are raised, for example, and a propylene is desirable especially. As nonconjugated diene, for example Moreover, 1, 4-hexadiene, 1, 6-OKUTA diene, The 2-methyl -1, 5-hexadiene, the 6-methyl -1, 5-heptadiene, The 7-methyl -1, chain-like nonconjugated diene like 6-OKUTA diene; A cyclohexadiene, A dicyclopentadiene, a methyl tetrahydro indene, 5-vinyl norbornene, 5-ethylidene-2-norbornene, 5-methylene-2-norbornene, Annular nonconjugated diene like 5-isopropylidene-2-norbornene and 6-chloro methyl-5-isopropenyl-2-norbornene; 2, 3-diisopropylidene-5-norbornene, 2-ethylidene-3-isopropanal pilus ten-5-norbornene, 2-propenyl-2 and 2-norbornadiene, Trien like 1, 3, 7-OKUTA trien, 1 and 4, and 9-deca trien is raised, and both 5-ethylidene-2-norbornene or 5-ethylidene-2-norbornene, and dicyclopentadiene are desirable especially.

[0009] (A) The ratio (mole ratio) of the ethylene / alpha olefin / nonconjugated diene in a component is usually 1/(0.1-1)/(0-0.2).

[0010] The (B) component of this invention is a surface treatment bulking agent which supports the compound which blends an alkali-metal salt content compound and/or an alkali-metal earth salt content compound, and is obtained to the mixture of the compound expressed with the compound and the following general formula (3) which are expressed with the compound and/or the following general formula (2) which are expressed with the aforementioned general formula (1) to a bulking agent, and is obtained.

[0011] As a bulking agent, a calcium carbonate, a silica, talc, clay, a magnesium carbonate, a zeolite, an aluminum sulfate, a barium sulfate, a mica, an aluminum hydroxide, a zinc oxide, a titanium white, etc. can be raised, and they are a calcium carbonate and a silica preferably. The powdered thing of a bulking agent is desirable. In addition, the DBA (dibutyl amine) amount of adsorption is 100 to 400 mmol/kg, and BET specific surface areas are 50-300m² / g, and the powdered thing of 5-12 has [the silica as a bulking agent] desirable pH.

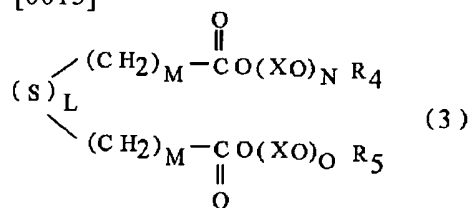
[0012] The diester compound guided as a desirable example of a compound expressed with a general formula (1) from the diester compound guided from screw [2-(2-butoxyethoxy) ethyl] horse mackerel peat, screw (2-butoxy ethyl) phthalate, and the polyethylene glycol and adipic acid of molecular weight 100-2000, and the polyethylene glycol and phthalic acid of molecular weight 100-2000 can be raised.

[0013] As a desirable example of a compound expressed with a general formula (2), trioxyethylene glycol dioctoate, tetrapod oxyethylene glycol dioctoate, and HEPUTA oxyethylene glycol dioctoate can

be raised.

[0014] In this invention, you may use together the compound expressed with the following general formula (3) according to the compound expressed with the compound and/or the aforementioned general formula (2) which are expressed with the aforementioned general formula (1).

[0015]



[0016] (M expresses L and 1, or 2 among a formula, N and O express the integer of 1-3, X expresses the alkylene machine of carbon numbers 2-4, and R₄ and R₅ express the straight chain of carbon numbers 1-8, or the alkyl group of branching.)

[0017] As a desirable example of a compound expressed with a general formula (3), screw [2-(2-butoxyethoxy) ethyl thiodipropionate and screw (2-butoxy ethyl) thiodipropionate can be raised.

[0018] (B) as the cation part of the alkali-metal salt of a component, or an alkaline-earth-metal salt -- Li, Na, K, Mg, Ba, calcium, etc. -- it can raise -- as an anion part -- Cl, Br, I, BF₄, platelet factor 4, ClO₄, NO₃, and CO₃ etc. -- it can raise

[0019] As an alkali-metal salt content compound or an alkali-metal earth salt content compound, it is LiClO₄, Ba (ClO₄)₂, and LiI and MgCO₃. It is desirable.

[0020] As opposed to the mixture of the compound expressed with the compound and general formula (3) which are expressed with the compound and/or general formula (2) which are expressed with a general formula (1) The compounding ratio in the case of blending an alkali-metal salt content compound and/or an alkali-metal earth salt content compound It is 0.1 - 20 weight section which is considered as the total quantity 0.01 of per [which is expressed with the compound and general formula (2) which are expressed with a general formula (1)] sum total weight 100 weight section of a compound, an alkali-metal salt content compound, and an alkali-metal earth salt content compound - 30 weight sections desirable still more preferably. an electric resistance value may not fully fall but may be inferior to the antistatic effect, when too little [the total quantity of an alkali-metal salt content compound and an alkali-metal earth salt content compound], when this total quantity is excessive, on the other hand, the effect of the fall of an electric resistance value to the amount of addition of an alkali-metal salt content compound and an alkali-metal earth salt content compound used becomes leveling off, and there is a bird clapper that it is uneconomical

[0021] (B) What is necessary is just to blend an alkali-metal salt content compound and/or an alkali-metal earth salt content compound to the compound expressed with the compound and/or general formula (2) which are expressed with a general formula (1), in order to obtain the compound in a component.

[0022] (B) 60 / 40 - 5/95 are desirable still more desirable, and the weight ratios of the compound/bulking agent in a component are 55 / 45 - 10/90. this -- the case where conductivity becomes [too little / a ratio / inadequate] -- it is -- on the other hand -- this -- a compound cannot support that a ratio is excessive on the surface of a bulking agent, but a compound may carry out bleeding to the front face of the obtained vulcanized rubber In addition, the weight of the bulking agent in the case of using together two or more sorts of bulking agents is based on the total quantity of a solid-stowing agent.

[0023] What is necessary is just to, make the bulking agent which is support support the above-mentioned compound, using a Henschel mixer, a tumbling drum, a super mixer, a ball mill, an atomizer, etc. as a method of obtaining the surface treatment bulking agent which is the (B) component of this invention, for example.

[0024] In the rubber constituent of this invention, it is desirable still more desirable that it is the 10 - 500 weight section, and the content of the (B) component per (A) component 100 weight section is the 10 -

400 weight section. (B) Conductivity may become [too little / a component / inadequate], on the other hand, compound viscosity may rise that the (B) component is excessive, and it may be inferior to processability. In addition, in this invention, although rubber other than the ethylene-alpha olefin system copolymer rubber which is the (A) component may be used together within limits which do not spoil the purpose of this invention, the amount of the above-mentioned (A) component in that case is based on the total quantity including the amount of all rubber.

[0025] In this invention, the point using the (B) component is the greatest feature. When only a bulking agent is used without being based on this invention, an electric resistance value cannot be made low enough. Moreover, when it uses without supporting the compound of this invention to a bulking agent, bleeding occurs and it is inferior to the appearance of vulcanization rubber goods.

[0026] As a method of obtaining the rubber constituent of this invention, the following method can be raised, for example. That is, it considers as a compound the (A) component of this invention, the (B) component, and if needed by kneading white fillers (extender), such as vulcanization promotion assistants, such as activators, such as softeners, such as reinforcing materials and a process oil, and stearin acid, and a zinc oxide, and a calcium carbonate, etc. using a Banbury mixer, a kneader, etc. Next, if *****, a vulcanization accelerator, etc. are used and an open roll, a kneader, etc. are kneaded to this compound, it will be alike, and it considers as the rubber constituent before vulcanization more.

Here, as a vulcanizing agent, sulfur and various kinds of organic peroxide are used. The rubber constituent before vulcanization is vulcanized on condition that usual.

[0027] The rubber constituent and vulcanized-rubber constituent of this invention have the aforementioned feature, and may be extensively used for fields, such as a roll of copying machines, such as various kinds of office-supplies parts and electric product parts, a belt, an electrical-part sealing agent, an antistatic mat, and a conductive sheet.

[0028]

[Example] Next, an example explains this invention.

It considered as the compound by kneading the combination shown in example 1 - example 6 and example 1 of comparison - example of comparison 5 table 1 and the stearin acid 1 weight section, the zinc white 5 weight section, the nip seal VN3 (silica) 15 weight section, the Diana PW-90 (process oil) 10 weight section, and the TIPAQUE R550 (titanium white) 10 weight section using a Banbury mixer. Next, the SOKUSHI Norian BZ(vulcanization accelerator) 1.0 weight section, the SOKUSHI Norian TT (vulcanization accelerator) 0.5 weight section, the SOKUSHI Norian TRA(vulcanization accelerator) 0.5 weight section, the SOKUSHI Norian M(vulcanization accelerator) 1.0 weight section, and the sulfur 1.0 weight section were looked like [this compound], when the open roll was used and addition kneading was carried out, and the rubber constituent was obtained more to it. Press cure of the obtained rubber constituent was carried out to the bottom of the condition for [160 degree-Cx] 15 minutes, and the vulcanized-rubber constituent was obtained. Evaluation as follows was performed about the vulcanized-rubber constituent.

[0029] (1) Conductivity : JIS K By the method based on 6911, volume resistivity was measured by applied-voltage 500V.

[0030] (2) Surface bleeding : the sheet of the obtained vulcanized rubber was left for one week at the room temperature, visual observation of the existence of surface bleeding was carried out, and O (good) and x (poor) estimated.

[0031] The combination shown in example 7 - example 8 and example 6 of comparison - example of comparison 7 table 2 and the stearin acid 1 weight section, the zinc white 5 weight section, the nip seal VN3 (silica) 30 weight section, the Diana PW-90 (process oil) 10 weight section, the TIPAQUE R550 (titanium white) 30 weight section, the PEG4000(polyethylene glycol) 2 weight section, and the silane-coupling-agent (A-172) 1 weight section are kneaded using a Banbury mixer. It considered as the compound. Next, this compound was resembled when addition kneading of the DCP(JIKUMI loop oxide) 3.5 weight section, the TAIC(triallyl isocyanurate) 2 weight section, and the sulfur 0.4 weight section was carried out, and the rubber constituent was obtained more. Press cure of the obtained rubber constituent was carried out to the bottom of the condition for [170 degree-Cx] 20 minutes, and the

vulcanized-rubber constituent was obtained. The same evaluation as the above was performed about the vulcanized-rubber constituent.

[0032] A result shows the following thing. All the examples that satisfy the conditions of this invention show the result which should be satisfied in all evaluation criteria. On the other hand, not using the (B) component of this invention, the example 1 of comparison which did not use a compound, either, the example 6 of comparison, the example 7 of comparison, and the example 2 of comparison using the conductive, comparatively little plasticizer are inferior to conductivity. Not using the (B) component of this invention, surface bleeding has occurred for the example 3 of comparison using a lot of compounds.

[0033]

[Table 1]

	実 施 例					
	1	2	3	4	5	6
配合 ^{*1} wt						
(A)						
種類	A-1	A-1	A-1	A-1	A-1	A-1
量	100	100	100	100	100	100
(B)						
種類	B-1	B-1	B-1	B-2	B-3	B-3
量	120	80	40	120	120	80
CaCO ₃	0	40	80	0	0	40
シリカ	0	0	0	0	0	0
化合物-1	0	0	0	0	0	0
化合物-2	0	0	0	0	0	0
評価結果						
体積固有抵抗Ω・cm	6.0 ×10 ⁶	2.0 ×10 ⁷	1.8 ×10 ⁸	5.4 ×10 ⁷	1.2 ×10 ⁷	2.1 ×10 ⁸
表面ブリード	○	○	○	○	○	○

[0034]

[Table 2]

	比 較 例				
	1	2	3	4	5
配合 ^{*1} wt					
(A)					
種類	A-1	A-1	A-1	A-1	A-1
量	100	100	100	100	100
(B)					
種類	-	-	-	-	-
量	0	0	0	0	0
CaCO ₃	120	120	120	63	0
シリカ	0	0	0	27	90
化合物-1	0	5	10	0	30
化合物-2	0	0	0	30	0
評価結果					
体積固有抵抗Ω・cm	2.8 ×10 ¹⁵	1.7 ×10 ¹⁰	2.3 ×10 ⁷	4.1 ×10 ⁶	7.2 ×10 ⁷
表面ブリード	○	○	×	×	×

[0035]

[Table 3]

	実 施 例		比 較 例	
	7	8	6	7
配合 [*] 1 wt				
(A)				
種類	A-2	A-2	A-2	A-2
量	100	100	100	100
(B)				
種類	B-1	B-1	B-1	B-1
量	100	150	0	0
CaCO ₃	0	0	100	150
配合物	0	0	0	0
評価結果				
体積固有抵抗Ω・cm	4.4 ×10 ⁷	2.1 ×10 ⁷	3.8 ×10 ¹⁵	4.8 ×10 ¹⁵
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[0036] *1 Combination A-1 : ethylene-propylene-5-ethylidene-2-norbornene copolymer rubber (Mooney viscosity =35 in ethylene ratio =80 % of the weight and iodine-value =15,100 degree C)
A-2: Ethylene-propylene-dicyclopentadiene copolymer rubber (Mooney viscosity =55 in ethylene ratio =65 % of the weight and iodine-value =8,100 degree C)
support article compound-1:screw [2- the weight ratio of a calcium carbonate / compound -1 -- the weight ratio of the support article B-2:silica / compound -1 of =75/25 -- the weight ratio of the support article B-3:calcium carbonate / silica / compound -2 of =75/25 -- =49/21/30 [B-1:] An ethyl] horse mackerel peat / screw [2- (2-butoxyethoxy) The mixture compound -2 of ethyl thiodipropionate / LiClO₄(weight ratio) =49/1/1 : The ester / LiClO₄ obtained from one mol of adipic acids, and two mols of polyethylene glycols of average molecular weight 600 (2-butoxyethoxy) = (Weight ratio) 20/1 of mixture CaCO₃ : Fine-particles-like calcium-carbonate common combination: Set to Table 1. It adds to a component ** and given in Table 1. as common combination The stearin acid 1 weight section, The zinc white 5 weight section, the nip seal VN3 (silica) 15 weight section, the Diana PW-90 (process oil) 10 weight section, The TIPAQUE R550 (titanium white) 10 weight section, the SOKUSHI Norian BZ (vulcanization accelerator) 1.0 weight section, The SOKUSHI Norian TT(vulcanization accelerator) 0.5 weight section, the SOKUSHI Norian TRA(vulcanization accelerator) 0.5 weight section, the SOKUSHI Norian M(vulcanization accelerator) 1.0 weight section, and the sulfur 1.0 weight section were used. Set to Table 2. It adds to a component ** and given in Table 2. as common combination The stearin acid 1 weight section, The zinc white 5 weight section, the nip seal VN3 (silica) 30 weight section, the Diana PW-90 (process oil) 10 weight section, The TIPAQUE R550 (titanium white) 30 weight section, the PEG4000(polyethylene glycol) 2 weight section, The silane-coupling-agent (A-172) 1 weight section, the DCP(JIKUMI looper oxide) 3.5 weight section, the TAIC(triallyl isocyanurate) 2 weight section, and the sulfur 0.4 weight section were used.

[0037]

[Effect of the Invention] By this invention, it was the rubber constituent which contains ethylene-alpha olefin system copolymer rubber in a rubber component, the electric resistance value was low, and, therefore, it excelled in conductivity, and generating of bleeding etc. was able to be prevented, therefore, it excelled in appearance, and the rubber constituent and vulcanized-rubber constituent which can moreover be made white were able to be offered as explained above.

[Translation done.]